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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,719	11/25/2003	Dingjun Wu	06469 USA	5752

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EXAMINER

RINEHART, KENNETH

ART UNIT	PAPER NUMBER
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3749

DATE MAILED: 09/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/721,719

Applicant(s)

WU ET AL.

Examiner

Kenneth B Rinehart

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 7-18, 22 and 23 is/are rejected.
- 7) ☒ Claim(s) 3-6 and 19-21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/25/2003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1, 7, 9-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al. Chen et al shows introducing a first gas mixture comprising a boron-containing reactive agent into the reactor wherein the first gas mixture reacts with the substance contained therein to provide a volatile product and a boron-containing by-product (col. 2, lines 20), introducing a second gas mixture comprising a fluorine-containing reactive agent into the reactor wherein the second gas mixture reacts with the boron-containing by-product contained therein to form the volatile product (col. 2, lines 22), and removing the volatile product from the reactor (col. 2, lines 23-26), the substance is at least one member selected from a transition metal oxide, a transition metal silicate, a Group 13 metal oxide, a Group 13 metal silicate, a nitrogen-containing Group 13 metal oxide, a nitrogen-containing Group 13 metal silicate, a nitrogen-containing transition metal oxide, a nitrogen-containing transition metal silicate, or a laminate comprising at least one layer of the group consisting of a transition metal oxide, a transition metal silicate, a Group 13 metal oxide, a Group 13 metal silicate, a nitrogen-containing Group 13 metal oxide, a nitrogen-containing Group 13 metal silicate, a nitrogen-containing transition metal oxide, a nitrogen-containing transition metal silicate, and mixtures thereof (col. 2, lines 13), the boron-containing reactive agent is at least one selected from BCl₃, BBr₃, BI₃, BF₃, and mixtures thereof (col. 2,

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line 20), the boron-containing reactive agent is BCl_3 (col. 2, lines 20), the fluorine-containing reactive agent is at least one selected from NF_3 , ClF_3 , ClF , SF_6 , a perfluorocarbon, a hydrofluorocarbon, an oxyfluorocarbon, a hypofluorite, a fluoroperoxide, a fluorotrioxide, COF_2 , NOF , F_2 , $\text{NF}_x\text{Cl}_{4-x}$ wherein x is a number ranging from 1 to 2, and mixtures thereof (col. 2, line 22), the fluorine-containing reactive agent is NF_3 (col. 2, line 61), the fluorine-containing reactive agent is F_2 (col. 2, line 16).

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 7-10, 14-18, 22, 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Ji et al (2004/0011380). Ji shows introducing a first gas mixture comprising a boron-containing reactive agent into the reactor wherein the first gas mixture reacts with the substance contained therein to provide a volatile product and a boron-containing by-product (page 4, line 18), introducing a second gas mixture comprising a fluorine-containing reactive agent into the reactor wherein the second gas mixture reacts with the boron-containing by-product contained therein to form the volatile product (table 7), and removing the volatile product from the reactor (fig. 1a), the reactor is an atomic layer deposition reactor (page 1, paragraph 7), the substance is at least one member selected from a transition metal oxide, a transition metal silicate, a Group 13 metal oxide, a Group 13 metal silicate, a nitrogen-containing Group 13 metal oxide, a nitrogen-containing Group 13 metal silicate, a nitrogen-containing transition metal oxide, a nitrogen-containing transition metal silicate, or a laminate comprising at least one layer of the group consisting of a transition metal oxide, a transition metal silicate, a Group 13 metal oxide, a Group 13 metal silicate, a nitrogen-containing Group 13 metal oxide, a nitrogen-containing

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Group 13 metal silicate, a nitrogen-containing transition metal oxide, a nitrogen-containing transition metal silicate, and mixtures thereof (claim 1), the substance is at least one selected from Al_2O_3 , HfO_2 , ZrO_2 , HfSi_xO_y , ZrSi_xO_y and mixtures thereof, wherein x is a number greater than 0 and y is $2x + 2$, and any of the aforementioned compounds containing nitrogen (page 1, paragraph 3), the boron-containing reactive agent is at least one selected from BCl_3 , BBr_3 , BI_3 , BF_3 , and mixtures thereof (page 4, col. 34), the boron-containing reactive agent is BCl_3 (page 4, col. 34), wherein the first gas mixture and/or the second gas mixture is conveyed to the reactor from at least one gas cylinder, a safe delivery system, or a vacuum delivery system (paragraph 33), the first gas mixture and/or the second gas mixture is formed in situ by a point-of-use generator (paragraph 33), the first gas mixture and/or the second gas mixture further comprises an inert gas diluent, the inert gas diluent is selected from nitrogen, CO, helium, neon, argon, krypton, xenon, and mixtures thereof (paragraph 35), providing the reactor wherein at least a portion of the surface is at least partially coated with the substance and wherein the substance has a dielectric constant of 4.1 or greater (paragraph 3), exposing the first gas mixture to one or more energy sources sufficient to generate active species that react with the substance and form a volatile product and a boron-containing byproduct (claim 11), exposing the second gas mixture to one or more energy sources sufficient to generate active species that react with the boron-containing byproduct and form the volatile product', and removing the volatile product from the reactor (claim 11), the temperature of the first and second introducing step is 150 c (paragraph 38), the pressure of the first and second exposing step is at least 10 mTorr (paragraph 38).

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The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Allowable Subject Matter

Claims 3-6, 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to processes in general: Ji et al (2004/0014327), Ji et al (6,686,594), Bernstein et al (6,221,169), Benzing (4,786,352), Ji et al (2003/009819).


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth B Rinehart whose telephone number is 703-308-1722. The examiner can normally be reached on 7:30 -4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ira Lazarus can be reached on 703-308-1935. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KBR


KENNETH RINEHART
PRIMARY EXAMINER